

What is claimed is:

1. A local performance simulation system comprising:
- 5 a signal generation system for simultaneously generating contact recording signals based on vibrations from an ensemble, the ensemble producing an audible ensemble sound pattern;
- a signal processing system for channelizing the contact recording signals and generating final instrument signals based on the channelized contact recording signals; and
- 10 a reproduction system for generating audible sound waves based on the final instrument signals, the sound waves simulating the ensemble sound pattern.
2. The simulation system of claim 1 wherein the ensemble includes a plurality of instruments.
3. The simulation system of claim 2 wherein the plurality of instruments includes a string quartet.
4. The simulation system of claim 2 wherein the signal generation system includes a plurality of contact recording configurations.
5. The simulation system of claim 4 wherein each contact recording configuration includes a pair of contact transducers coupled to a corresponding instrument at a location governed by a cross-correlation function as measured in different frequency bands.

6. The simulation system of claim 5 wherein the pair of contact transducers includes:

a first transducer located below an f-hole of the corresponding instrument, the first transducer generating a contact recording signal based on vibrations near the f-hole; and

a second contact transducer located under a bridge of the corresponding instrument, the second transducer generating a contact recording signal based on vibrations near the bridge.

7. The simulation system of claim 1 wherein the signal processing system includes:

a storage system for storing the contact recording signals to a storage medium as channelized data; and

a retrieval system for retrieving the channelized data from the storage medium.

8. The simulation system of claim 7 wherein the storage system includes:

an analog to digital conversion system for generating digital recording signals based on the contact recording signals; and

a recording system for generating the channelized data based on the digital recording signals, the recording system recording the channelized data to the storage medium.

9. The simulation system of claim 8 wherein the retrieval system includes:

an equalization system for tailoring a frequency response of the channelized data;

5 a mixing system for generating intermediate instrument signals based on the channelized data;

a digital to analog conversion system for generating final instrument signals based on the intermediate instrument signals; and

an amplifier for amplifying the final instrument signals.

10. The simulation system of claim 2 wherein the reproduction system includes:

a plurality of loudspeaker systems, each loudspeaker system having a corresponding instrument and generating audible sound waves which
5 approximate a frequency dependence of radiation from front, back and side surfaces of the assigned instrument; and

a means for simulating musician absorption of the audible sound waves.

11. The simulation system of claim 10 wherein each loudspeaker system includes:

a front driver having a predetermined front piston diameter for approximating the frequency dependence of radiation from front and side surfaces of the assigned instrument;

a back driver having a predetermined rear piston diameter for approximating the frequency dependence of radiation from back and side surfaces of the assigned instrument.

12. A method for simulating a local performance of an ensemble, the method comprising the steps of:

simultaneously generating contact recording signals based on vibrations from the ensemble, the ensemble producing an audible ensemble sound pattern;

5 channelizing the contact recording signals;

generating final instrument signals based on the channelized contact recording signals; and

generating audible sound waves with a reproduction system based on the final instrument signals, the sound waves simulating the ensemble sound pattern.

13. The method of claim 12 wherein the ensemble includes a plurality of instruments.

14. The method of claim 13 wherein the plurality of instruments includes a string quartet.

15. The method of claim 13 further including the step of coupling a pair of contact transducers to a corresponding instrument at a location governed by a cross-correlation function as measured in different frequency bands.

16. A method for tuning a local performance simulation system, the method comprising the steps of:

matching a system overall frequency response to a known overall frequency response;

5 matching a system coarse asymmetrical frequency response to a known coarse asymmetrical frequency response; and

approximating a system fine asymmetrical frequency response to a known fine asymmetrical frequency response such that the system overall frequency response, the system coarse asymmetrical frequency response and system fine asymmetrical frequency response approximating a frequency response of an
10 audible ensemble sound pattern produced by an ensemble.

17. The method of claim 16 further including the steps of:

selecting an instrument from the ensemble;

playing scales on the instrument;

simultaneously generating a contact recording and a microphone
5 recording based on the ensemble sound pattern; and

comparing spectral characteristics of the contact recording and the microphone recording.

18. The method of claim 16 further including the steps of:
selecting an instrument from the ensemble;
playing scales on the instrument;
generating a contact recording based on the ensemble sound pattern; and
5 comparing spectral characteristics of the contact recording with a
predetermined reference spectrum.

19. The method of claim 16 further including the steps of:
selecting an instrument from the ensemble;
playing scales on the instrument;
generating a contact recording based on the ensemble sound pattern; and
5 manually adjusting spectral characteristics of the contact recording.

20. The method of claim 16 wherein the ensemble is a string quartet.